**Before the**
**Federal Communications Commission**
**Washington, D.C. 20554**



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| In the Matter of | ) | |
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| Promoting Interoperability in the 700 MHz Commercial Spectrum | ) | WT Docket No. 12-69 |
| | ) | |
| | ) | |
| Interoperability of Mobile User Equipment Across Paired Commercial Spectrum Blocks in the 700 MHz Band | ) | RM-11592 (Terminated) |
| | ) | |
| | ) | |

**NOTICE OF PROPOSED RULEMAKING**

**Adopted: March 21, 2012** **Released: March 21, 2012**

**Comment Date: [60 days after date of publication in the Federal Register]**
**Reply Comment Date: [105 days after date of publication in the Federal Register]**

By the Commission: Chairman Genachowski and Commissioners McDowell and Clyburn issuing separate statements.

**TABLE OF CONTENTS**

Heading Paragraph #



## I. INTRODUCTION

1. The Communications Act directs the Commission to, among other things, promote the widest possible deployment of communications services, ensure the most efficient use of spectrum, and protect and promote vibrant competition in the marketplace. On each occasion where the Commission has made available new spectrum for mobile telephony and/or broadband, it has strived to meet these important goals. This was the case when the Commission launched its proceeding to free up the 700 MHz band for commercial mobile services, as it expressly recognized the need to "balance several competing goals, including facilitating access to spectrum by both small and large providers, providing

for the efficient use of the spectrum, and better enabling the delivery of broadband services in the 700 MHz Band."[1]

2. Since the completion of the 700 MHz auction and the subsequent clearing of the spectrum, however, certain Lower 700 MHz A Block licensees have asserted that the development of two distinct band classes within the Lower 700 MHz band has hampered their ability to have meaningful access to a wide range of advanced devices.[2] The result, they argue, is that this spectrum is being built out less quickly than anticipated (and in some cases not at all), so that a large number of Lower 700 MHz A Block licensees are unable to provide the level of service and degree of competition envisioned at the close of the auction and as contemplated by the Communications Act. The 700 MHz band, at 70 megahertz, one of the largest commercial mobile service bands, is the only non-interoperable commercial mobile service band.

3. The record to date in response to the underlying Petition for Rulemaking reveals disagreement over the rationale for the distinct band classes, and the wisdom of maintaining both.[3] At its core, the dispute is whether a unified band class would result in harmful interference to Lower 700 MHz licensees in the B and C Blocks and whether, if harmful interference exists, it reasonably can be mitigated.

4. There is express agreement, however, that a unified band class across the Lower 700 MHz band has the potential to yield significant benefits for all licensees. Indeed, as AT&T, the primary holder of Lower B and C Block licenses, affirmed in a recent letter to the Commission, "[AT&T] indeed anticipate[s] that there would be increased opportunity [if interference concerns were addressed] for commercial relationships with A Block licensees."[4] Unfortunately, no industry-led solution to the lack of interoperability has yet emerged.

5. Therefore, we initiate this rulemaking proceeding to promote interoperability in the

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[1] Service Rules for the 698-746, 747-762 and 777-792 MHz Band, WT Docket No. 06-150, Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, CC Docket No. 94-102, Section 68.4(a) of the Commission's Rules Governing Hearing Aid-Compatible Telephone, WT Docket No. 01-309, Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services, WT Docket No. 03-264, Former Nextel Communications, Inc. Upper 700 MHz Guard Band Licenses and Revisions to Part 27 of the Commission's Rules, WT Docket No. 06-169, Implementing a Nationwide, Broadband Interoperable Public Safety Network in the 700 MHz Band, PS Docket No. 06-229, Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State, and Local Public Safety Communications Requirements Through the Year 2010, WT Docket No. 96-86, Declaratory Ruling on Reporting Requirement Under Commission's Part 1 Anti-Collusion Rule, WT Docket No. 07-166, *Second Report and Order*, 22 FCC Rcd 15289, 15305 ¶ 44 (2007) (*700 MHz Second Report and Order*).

[2] *See* 700 MHz Block A Good Faith Purchaser Alliance Petition for Rulemaking Regarding the Need for 700 MHz Mobile Equipment to be Capable of Operating on All Paired Commercial 700 MHz Frequency Blocks, filed Sept. 29, 2009 (Petition).

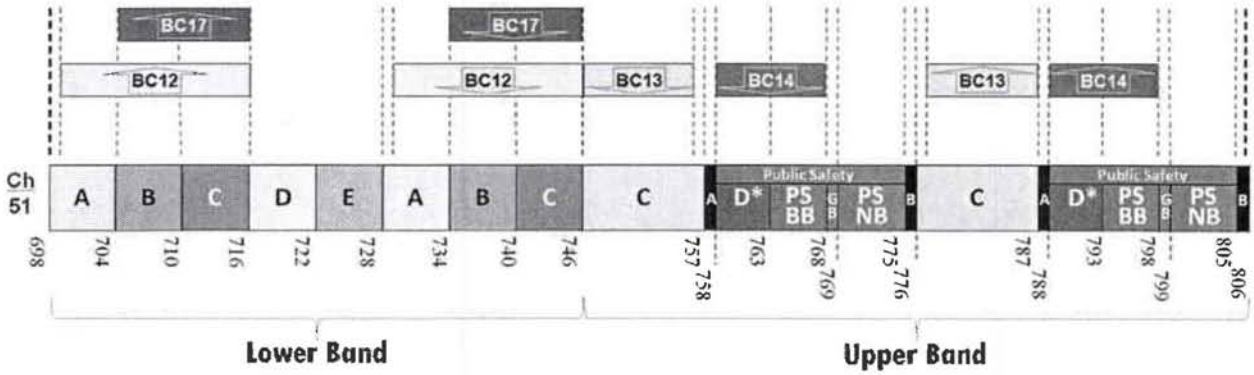
[3] The Petition was placed on Public Notice for comment in RM-11592. *See infra* note 26. The record in WT Docket No. 11-18 also discussed the distinct band classes and interoperability concerns in the Lower 700 MHz band. *See* Application of AT&T Inc. and Qualcomm Incorporated For Consent To Assign Licenses and Authorizations, WT Docket No. 11-18.

[4] Letter from Joan Marsh, Vice President – Federal Regulatory, AT&T, to Marlene H. Dortch, FCC, WT Docket No. 11-18, filed Dec. 21, 2011 (AT&T Dec. 21, 2011 *Ex Parte* in WT Dkt. No. 11-18), at 2.

Lower 700 MHz band and to encourage the efficient use of spectrum.[5] We will evaluate whether the customers of Lower 700 MHz B and C Block licensees would experience harmful interference – and if so, to what degree – if the Lower 700 MHz band were interoperable. We also explore the next steps should we find that interoperability would cause limited or no harmful interference to Lower 700 MHz B and C Block licensees, or that such interference can reasonably be mitigated through industry efforts and/or through modifications to the Commission's technical rules or other regulatory measures.

## II. BACKGROUND

6. *700 MHz Band.* The 700 MHz band (698-806 MHz), illustrated in the following figure, is comprised of 70 megahertz of commercial, non-guard band spectrum, 4 megahertz of guard band spectrum, 24 megahertz of public safety spectrum, and 10 megahertz of spectrum that will be reallocated for public safety use pursuant to recent Congressional mandate.[6]




"BCxx" indicates Band Classes proposed as part of the international 3GPP industry LTE technical standards processes.

*The D Block will be reallocated for use by public safety entities as directed by the Middle Class Tax Relief and Job Creation Act of 2012

7. As shown above, the Lower 700 MHz band spectrum (698-746 MHz) consists of 48 megahertz of commercial spectrum, with three blocks of 12 megahertz each of paired spectrum (Lower A, B, and C Blocks), and two blocks of 6 megahertz each of unpaired spectrum (Lower D and E Blocks). The Lower A Block spectrum is adjacent to Channel 51 (692-698 MHz), which has been allocated for TV broadcast operations at power levels of up to 1000 kW.[7] The Lower A Block is also adjacent to the

[5] The Commission has a longstanding interest in promoting the interoperability of mobile user equipment in a variety of contexts as a means to promote the widest possible deployment of mobile services, ensure the most efficient use of spectrum, and protect and promote competition. *See infra* ¶¶ 17-29.

[6] Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, 126 Stat. 158, 205 (directing the Commission to "reallocate the 700 MHz D Block spectrum for use by public safety entities") (to be codified at 47 U.S.C. § 1411) ("Spectrum Act").

[7] *See* 47 C.F.R. § 73.622(f)(8). Maximum ERP of 1000 kW is allowed if antenna HAAT is at or below 365 meters. For higher HAAT levels, lower maximum ERP is allowed according to the "Maximum Allowable ERP and Antenna Height for DTV Stations on Channels 14-59, All Zones" table.

unpaired Lower 700 MHz E Block, where licensees (along with Lower 700 MHz D Block licensees) may operate at power levels up to 50 kW.[8] The Upper 700 MHz band (746-806 MHz) consists of the C Block, which is comprised of 22 megahertz of paired spectrum for commercial use, two guard bands, the public safety allocation, and the D Block, which consists of 10 megahertz of paired spectrum that will be reallocated for use by public safety entities, in accordance with the Spectrum Act.[9]

8. *Assignment of Licenses in the 700 MHz Band.* The Commission has assigned licenses for the 700 MHz band through several auction proceedings. The Commission auctioned licenses for the guard bands in the Upper 700 MHz band in 2000, and it initially auctioned licenses in the Lower C and D Blocks in 2002.[10] In 2008, the Commission auctioned licenses in the Lower 700 MHz band A, B, and E Blocks, as well as the Upper 700 MHz band C Block.[11]

9. *Performance Requirements.* In adopting rules for the 700 MHz band, the Commission's goals included promoting commercial access to 700 MHz band spectrum,[12] as well as providing licensees with flexibility in the services to be offered and the technologies to be deployed.[13] For the Lower 700

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[8] *See* 47 C.F.R. § 27.50(c)(7). Lower 700 MHz C, D, and E Block fixed and base stations may operate at total power levels up to 50 kW ERP in their authorized 6 megahertz spectrum blocks. In the recent ATT-Qualcomm transaction, in which AT&T acquired all of the Lower 700 MHz D Block licenses and Lower 700 MHz E Block licenses covering 70 million people, the Commission conditioned the assignment of these licenses on AT&T's compliance with the requirements that: (1) it operates on the associated spectrum under the same power limits and antenna height restrictions that apply to the Lower 700 MHz A, B, and C Block licensees; (2) it does not use the acquired licenses for uplink transmission; and (3) its operations on the associated spectrum avoid undue interference to operations of other Lower 700 MHz A, B, and C Block licensees, as specified therein. Application of AT&T Inc. and Qualcomm Incorporated For Consent To Assign Licenses and Authorizations, *Order*, WT Docket No. 11-18, 26 FCC Rcd 17589, 17616-18 ¶¶ 61-68 (2011) (*AT&T/Qualcomm Order*).

[9] *See supra* note 6.

[10] *See* Lower 700 MHz Band Auction Closes, *Public Notice*, 17 FCC Rcd 17272 (2002); 700 MHz Guard Bands Auction Closes, *Public Notice*, 15 FCC Rcd 18026 (2000).

[11] *See* Auction of 700 MHz Band Licenses Closes, *Public Notice*, 23 FCC Rcd 4572 (2008). The Commission also conducted an auction for a single, nationwide license covering the entire Upper 700 MHz D Block, but bidding for that license did not meet the applicable reserve price of $1.33 billion. Pursuant to the Commission's rules, there was consequently no winning bid for that license. *See* Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, WT Docket No. 06-150, Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band, PS Docket No. 06-229, *Second Further Notice of Proposed Rulemaking*, 23 FCC Rcd 8047, 8049 ¶ 1 (2008). Recent legislation has directed the Commission to reallocate the Upper 700 MHz D Block spectrum for public safety use. *See supra* note 6.

[12] *See 700 MHz Second Report and Order*, 22 FCC Rcd at 15292 ¶ 3; Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59), GN Docket No. 01-74, *Report and Order*, 17 FCC Rcd 1022, 1079 ¶¶ 149-51 (2002) (*Lower 700 MHz Report and Order*).

[13] *See 700 MHz Second Report and Order*, 22 FCC Rcd at 15328 ¶ 95; Facilitating the Provision of Spectrum-Based Services to Rural Areas and Promoting Opportunities for Rural Telephone Companies to Provide Spectrum-Based Services, WT Docket No. 02-381, 2000 Biennial Regulatory Review Spectrum Aggregation Limits for Commercial Mobile Radio Services, WT Docket No. 01-14, Increasing Flexibility to Promote Access to and the Efficient and Intensive Use of Spectrum and the Widespread Deployment of Wireless Services, and to Facilitate Capital Formation, WT Docket No. 03-202, *Report and Order and Further Notice of Proposed Rulemaking*, 19 FCC Rcd 19078, 19079 ¶ 1 (2004) (*Rural Report and Order*); Principles for Reallocation of Spectrum to Encourage the Development of Telecommunications Technologies for the New Millennium, *Policy Statement*, 14 FCC Rcd 19868 (1999); Principles for Promoting the Efficient Use of Spectrum by Encouraging the Development of Secondary Markets, *Policy Statement*, 15 FCC Rcd 24178 (2000); 47 U.S.C. § 303(y).

MHz C and D Block licenses that were auctioned in 2002, the Commission required licensees to provide "substantial service" to their license service areas no later than the end of the license term.[14] In 2007, the Commission adopted performance requirements for licenses in the 700 MHz band that subsequently were auctioned in 2008, including Lower 700 MHz A Block.[15] Specifically, Cellular Market Area (CMA)-based and Economic Area (EA)-based licensees are required to provide service sufficient to cover 35 percent of the geographic area of their licenses within four years and 70 percent of this area within ten years (the license term), and Regional Economic Area Grouping (REAG) licensees must provide service sufficient to cover 40 percent of the population of their license areas within four years and 75 percent of the population within ten years. For licensees that fail to meet the applicable interim benchmark, the license term is reduced by two years, which would require that the end-of-term benchmark be met within eight years, and the Commission may take other enforcement action.[16] At the end of the license term, licensees that fail to meet the end-of-term benchmark are subject to a "keep what you use" rule, which will make unused spectrum available to other potential users.[17]

10. *Development of 3GPP Technical Standards*. Industry standards for Long-Term Evolution (LTE) wireless broadband technology are developed by the 3rd Generation Partnership Project (3GPP), a consensus-driven international partnership of industry-based telecommunications standards bodies. 3GPP, established in 1998, is an industry-based group and it is not associated with any governmental agency.[18] In the Lower 700 MHz band, there are two different 3GPP operating bands:[19] Band Class 12, which covers operations in the Lower A, B, and C Blocks, and Band Class 17, which covers operations in the Lower B and C Blocks only. The spectrum to which Band Class 17 applies is a subset of the spectrum covered by Band Class 12. Entities involved in the creation of Band Class 17 during 3GPP proceedings assert that it was necessary to create a separate band class for Lower 700 MHz B and C Block licenses in order to avoid interference issues from DTV in Channel 51 and high power operations in the E Block.[20] In the Upper 700 MHz band, the Band Class 13 specification provides for

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[14] *See* 47 C.F.R. § 27.14(a); *Lower 700 MHz Report and Order*, 17 FCC Rcd at 1079 ¶¶ 149-51. Lower 700 MHz licenses have a term of ten years from June 13, 2009, except for any licensees providing broadcast services, which have a term not to exceed eight years. *See* 47 C.F.R. § 27.13(b).

[15] *See 700 MHz Second Report and Order*, 22 FCC Rcd at 15348 ¶ 153.

[16] *See* 47 C.F.R. §§ 27.14(g)(1), (h)(1). In December, 2011, the Wireless Telecommunications Bureau announced that the deadline for 700 MHz performance reports was January 13, 2012, and reminded licensees of enforcement actions for failure to meet interim construction benchmarks. *See* 700 MHz Construction and Reporting Requirements, *Public Notice*, DA 11-1981, 26 FCC Rcd 16442 (WTB 2011).

[17] *See 700 MHz Second Report and Order*, 22 FCC Rcd at 15293-94 ¶ 6.

[18] Its world-wide partners come from Asia, Europe, and North America. 3GPP's many technical specification groups meet in various countries throughout the year to carry out the organization's mission. *See* 3GPP – ABOUT 3GPP, http://www.3gpp.org/-About-3GPP (last visited Mar. 12, 2012). For the schedules of the meetings, *see* 3GPP – 3GPP CALENDAR, http://www.3gpp.org/3GPP-Calendar (last visited Mar. 12, 2012).

[19] Hereinafter, we refer to each 3GPP LTE Operating Band as a "Band Class." For example, we refer to 3GPP LTE Operating Band 12 as "Band Class 12."

[20] *See, e.g.,* Letter from Michael Goggin, General Attorney, AT&T, to Marlene H. Dortch, FCC, filed July 29, 2011 (AT&T July 29, 2011 *Ex Parte*) at 1 (claiming that during the 3GPP standard setting process, there was concern regarding potential interference to Lower A Block mobile reception because of high power transmissions on the Lower E Block, and therefore, as a result, it adopted a Band Class 17, which covered only the Lower 700 MHz B and C Blocks, and a Band Class 12, which covers the Lower 700 MHz A, B, and C Blocks); Motorola Comments at 4-6 (discussing the development of the 3GPP band classes for the 700 MHz Band and claiming that "[t]he decision

(continued....)

operations in the Upper C Block, and Band Class 14 provides for operations in the public safety spectrum (including the Upper 700 MHz D Block). 3GPP has adopted certain technical specifications for user equipment operating in different 700 MHz bands. Output power and the OOBE specifications for LTE equipment are the same for all commercial paired frequencies in the Lower 700 MHz band.[21] The 3GPP specifications differ for receiver blocking requirements. The 3GPP specified requirements for receiver blocking are the same for Band Class 13 and Band Class 14 equipment, but Band Class 12 and Band Class 17 each have different and distinct blocking requirements, due to differences in each band's relative proximity to neighboring high-powered operations in the E block.[22]

11. *700 MHz Interoperability Petition for Rulemaking.* In late 2009, an alliance comprised of four Lower 700 MHz A Block licensees (Petitioners) filed a petition for rulemaking, asking the Commission to "assure that consumers will have access to all paired 700 MHz spectrum that the Commission licenses, to act so that the entire 700 MHz Band will develop in a competitive fashion, and to adopt rules that prohibit restrictive equipment arrangements that are contrary to the public interest."[23] Petitioners request the Commission to require that all mobile units for the 700 MHz band be capable of operating over all frequencies in the band.[24] Petitioners further request "an immediate freeze on the authorization of mobile equipment that is not capable of operation on all paired commercial 700 MHz frequencies."[25] The Wireless Telecommunications Bureau sought comment on the Petition in 2010.[26]

12. The Commission received 18 comments and 13 reply comments in response to the Petition. Commenters are divided on the merits of the relief sought in the Petition. Commenters in support of the Petition include smaller, regional 700 MHz licensees, a coalition including Sprint Nextel

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to identify [B]and [C]lass 17 separately from [B]and [C]lass 12 was based entirely on desire to avoid harmful interference that would negatively affect the operation of 700 MHz mobile broadband devices"); Letter from Alan K. Tse, Vice President and General Counsel, LG Electronics MobileComm U.S.A., to Marlene H. Dortch, FCC, filed June 11, 2010 at 4 ("[i]n the case of Bands 12 and 17, distinctions were made due to regulatory and interference limitations on the Lower 700 MHz A Block").

[21] *See* Sections 6.2.2, 6.6.2, and 6.6.2.2.3 of 3GPP TS 36.101 V9.9.0 (2011-09). The class 3 devices (UE) maximum transmit power is 23dBm for all bands with ±2dB tolerance, and Table 6.6.2.2.3-1 specifies the spectrum emission limits for available channel bandwidths.

[22] Receiver blocking requirements address a receiver's ability to receive at least 95% of the maximum throughput at its assigned channel in the presence of an unwanted interfering signal falling into the device receive band or into the first adjacent 15 megahertz. *See* Table 7.6.1.1-2, Section 7.6.1 of 3GPP TS 36.104 V9.9.0 (2011-09). Unlike Band Class 17, 3GPP determined that Band Class 12 cannot achieve the typical minimum specification for blocking interference from the Lower 700 MHz E Block, so this requirement was omitted from the Band 12 technical specification.

[23] Petition at 1. The Alliance is a "joint venture" consisting of Cellular South Licenses, Inc.; Cavalier Wireless, LLC; Continuum 700, LLC; and King Street Wireless, L.P., each of which is currently the licensee of Lower 700 MHz Band A Block spectrum. *Id.*

[24] Petition at iii, 12.

[25] Petition at 1-2.

[26] Wireless Telecommunications Bureau Seeks Comment on Petition for Rulemaking Regarding 700 MHz Band Mobile Equipment Design and Procurement Practices, RM No. 11592, *Public Notice*, 25 FCC Rcd 1464 (2010) (*700 MHz Interoperability PN*). All future filings concerning RM-11592 should be made in this docket, WT Docket No. 12-69.

and T-Mobile,[27] trade associations representing rural and smaller providers,[28] a coalition of public interest groups,[29] and public safety associations.[30] These supporters assert that the mobile devices currently being developed for AT&T and Verizon Wireless preclude supporting operation on Lower A Block spectrum and that this is contrary to the public interest and anti-competitive.[31] They argue that small providers that acquired Lower band 700 MHz Block A spectrum are left without viable and widely usable equipment options. Thus, they contend that unless Verizon Wireless and AT&T are required to support Band Class 12 in their devices, Lower A Block licensees will not be able to obtain devices with competitive economies of scale.[32] They also argue that requiring full 700 MHz support will maximize roaming opportunities.[33] Specifically, Petitioners assert that a prerequisite for negotiating roaming agreements is the availability of capable devices and that there is no basis for negotiation if there are no mobile devices that work across 700 MHz frequency blocks.[34] While the Petition requests interoperability across the entire 700 MHz band, subsequent filings from some of the proponents of an interoperability requirement, including parties to the Petition, have asked the Commission to first focus on establishing an interoperability requirement for the Lower 700 MHz band.[35]

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[27] The coalition is Connect Public Safety Now (CPSN), formerly Coalition for 4G in America. Its members include Sprint Nextel, T-Mobile, MetroPCS, Cricket, Cellular South, Rural Cellular Association, Xanadoo, New America Foundation, Media Access Project, and Access Spectrum.

[28] The trade associations include Rural Cellular Association, National Telecommunications Cooperative Association, and Rural Telecommunications Group.

[29] The coalition is the Public Interest Spectrum Coalition (PISC). Its members are the Consumer Federation of America, Consumers Union, Media Access Project, New America Foundation, and Public Knowledge. *See* PISC Reply Comments at 1.

[30] The public safety associations are the National Fraternal Order of Police (FOP) and The Public Safety Spectrum Trust (PSST). These associations support interoperability in the 700 MHz band generally but urge the Commission to carefully evaluate the technical feasibility and economic viability of requiring devices that "cover *all* 700 MHz paired spectrum" before ruling on the Petition. PSST Comments at 9-10 (emphasis in original); *see also* FOP Comments at 10.

[31] Petitioners Reply Comments at 2, 27-28; NTCA Comments at 3; PVT Comments at 4; PVT Reply Comments at 2-5; MetroPCS Comments at 4-6, 10; Triad 700 Comments at 10; U.S. Cellular Reply Comments at i-ii, 7; Cellular South Comments at 9; RCA Reply Comments at 8; PISC Reply Comments at 2; RTG Reply Comments at 7-8.

[32] Petitioners Reply Comments at 13, 28-29; PISC Reply Comments at 2-3; Letter from Mark A. Stachiw, Executive Vice President, General Counsel, and Secretary, MetroPCS Communications, Inc., Lawrence R. Krevor, Vice President, Spectrum, Sprint Nextel Corp. *et al.*, to Marlene H. Dortch, FCC, filed May 10, 2010, Attachment, 700 MHz Band Analysis by Wireless Strategy LLC, at 6 (MetroPCS *et al.* May 10, 2010 *Ex Parte*) (additional parties to the filing are T-Mobile USA, Access Spectrum, Xanadoo Co., Rural Telecom. Group, Triad 700, U.S. Cellular, RCA, and Cellular South); Vulcan Reply Comments at 2-3; PVT Comments at 3-4; PVT Reply Comments at 2, 11; Blooston Comments at 3; U.S. Cellular Comments at 5; Cellular South Comments at 3-5; RCA Comments at 19; Cox Comments at 3; MetroPCS Comments at 6; RTG Comments at 3, 10.

[33] *See, e.g.,* Petitioners Reply Comments at 19-23; RCA Reply Comments at 7-9; PVT Reply Comments at 4-5; RTG Reply Comments at 8-9; Cellular South Comments at 4-5; NTCA Comments at 3-4; Blooston Comments at 2-5; MetroPCS Comments at 11, 13; Triad 700 Comments at 5; U.S. Cellular Comments at 8.

[34] Petitioners Reply Comments at 22-23.

[35] For example, Cellular South requests that there be a single specification – Band Class 12 – for the Lower 700 MHz Band and a single specification for the Upper 700 MHz Band. Letter from David L. Nace and Thomas Gutierrez, Lukas, Nace, Gutierrez, and Sachs, LLP, Counsels for Cellular South and King Street (respectively), to

(continued....)

13. In their initial comments, parties such as AT&T and Verizon Wireless,[36] device manufacturers Motorola and Qualcomm, and TIA, a manufacturer trade association, opposed the Petition. They argued that without Band Class 17 filtering, Lower 700 MHz B and C licensees will face greater levels of harmful interference.[37] Further, they suggested that an interoperability requirement at that time, spring 2010, would have unnecessarily delayed the deployment of 700 MHz mobile broadband devices.[38] They contended that the existing 3GPP band classes were crafted through an open process and are responsive to the realities of the engineering and manufacturing constraints of the Commission-defined spectrum blocks.[39] Further, AT&T asserted that nothing prevents 700 MHz A Block licensees from negotiating roaming deals with any provider offering services on other 700 MHz blocks.[40] AT&T also argued that even if A Block licensees will have greater difficulty or face higher costs in developing handsets for use on the A Block, those disadvantages are fully reflected in the lower prices A Block licensees paid to obtain A Block spectrum.[41]

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Marlene H. Dortch, FCC, filed May 27, 2011 (Cellular South/King Street May 27, 2011 *Ex Parte*) Attachment at 12. While RCA requests that the Commission require interoperability across the entire 700 MHz Band, RCA requests that it do so "most immediately in the lower portion of the band." Letter from Rebecca M. Thomson, General Counsel, RCA, to Marlene H. Dortch, FCC, filed Nov. 22, 2011 at 1. *See also* Letter from Rebecca Murphy Thompson, General Counsel, Rural Cellular Association, to Marlene Dortch, FCC, filed March 15, 2012 at 2-3 (arguing that "lower band interoperability is achievable in the short term and should not be slowed by the complex issue of full band interoperability"); Letter from Thomas Gutierrez, Lukas, Nace, Gutierrez and Sachs, LLP, Counsel for Cavalier Wireless, LLC, to Marlene H. Dortch, filed Dec. 8, 2011, at 2 (Cavalier Wireless Dec. 8, 2011 *Ex Parte*) (advocating a "one-band" solution that involves only the Lower 700 MHz Band); *see also* Letter from M. Chris Riley and Matthew F. Wood, Free Press, to Marlene H. Dortch, FCC, filed Dec. 20, 2011, at 1-2 (*Free Press Dec. 20, 2011 Ex Parte*) (urging the Commission to condition AT&T's acquisition of Qualcomm's licenses on certain conditions, including "a mandate on interoperability across the lower 700 MHz spectrum bands"). In a recent filing, Verizon Wireless also requests that the Commission limit this proceeding to the Lower 700 MHz spectrum band. Letter from Tamara Preiss, Vice President, Federal Regulatory Affairs, Verizon Wireless, to Marlene H. Dortch, FCC, filed January 25, 2012 at 2.

[36] AT&T holds licenses in the Lower B and Lower C Blocks, as well as all of the Lower 700 MHz D Block and a significant number of Lower E Block licenses, recently acquired from Qualcomm. *See supra* note 8. Verizon Wireless holds licenses in the Lower 700 MHz A and B Blocks, and all of the spectrum in the Upper C Block. Neither of the other two nationwide wireless providers, Sprint Nextel and T-Mobile, holds any 700 MHz licenses.

[37] *See, e.g.,* AT&T Comments at 5-7; AT&T Reply Comments at 10, 11; Letter from Joseph P. Marx, Assistant Vice President, Federal Regulatory, AT&T, to Marlene H. Dortch, FCC, filed June 3, 2010 (AT&T June 3, 2010 *Ex Parte*) at 1-10; Verizon Wireless Reply Comments at 2; Motorola Comments at 8-9; Qualcomm Comments at 6; TIA Reply Comments at 2. *See also* Letter from Joan Marsh, Vice President – Federal Regulatory, AT&T, to Marlene H. Dortch, FCC, WT Docket No. 11-18, filed Dec. 9, 2011 (AT&T Dec. 9, 2011 *Ex Parte* in WT Dkt. No. 11-18) at 2-4 (opposing an interoperability condition in connection with the proposed assignment of 700 MHz spectrum from Qualcomm to AT&T).

[38] *See, e.g.*, CEA Comments at 2; Qualcomm Comments at 1-3; Motorola Comments at 8; TIA Reply Comments at 3; Verizon Wireless Reply Comments at 2; AT&T June 4, 2010 *Ex Parte* at 2.

[39] *See, e.g.*, AT&T Comments at 2-7; AT&T Reply Comments at 14-15; Verizon Wireless Comments at 2-4; Verizon Wireless Reply Comments at 9; Motorola Comments at 4. A number of parties also assert that granting the Petition would contradict the Commission's policy of technology neutrality. *See, e.g.*, Motorola Comments at 8-9; Qualcomm Comments at 6-8; AT&T Reply Comments at 6-9.

[40] AT&T Reply Comments at 17.

[41] AT&T June 3, 2010 *Ex Parte* at 11.

14. *Workshop on Interoperability.* Last year, to update the record and gather additional information, the Wireless Telecommunications Bureau held a workshop on the status and availability of interoperable mobile user equipment across commercial spectrum blocks in the 700 MHz band.[42] Panelists included a range of industry experts, including licensees holding spectrum in different portions of the 700 MHz band, as well as public interest advocates and equipment manufacturers. In addition to exploring solutions for promoting the development and availability of equipment for the 700 MHz band, the workshop discussed providers' technology choices, such as the planned deployment of LTE, and how these technology choices affect equipment availability, competition, and roaming. Panelists discussed the technical feasibility of an interoperability condition,[43] as well as how an interoperability requirement might affect such factors as device cost and performance,[44] and the need for additional development and testing.[45]

15. *Other Developments Regarding the 700 MHz Band.* On March 15, 2011, CTIA and RCA filed a petition for rulemaking and request for licensing freezes on Channel 51, urging the Commission to facilitate the deployment of wireless broadband services in the Lower 700 MHz A Block by providing a stable interference environment that allows licensees to plan network deployments.[46] The petition noted the potential for interference between Channel 51 broadcast and Lower 700 MHz A Block licensees.[47] On March 28, 2011, the Media Bureau requested comment on the petition,[48] and in August 2011, the Media Bureau adopted a freeze on the filing of certain applications with respect to operations on Channel 51.[49] The freeze covers (1) applications for low power television, TV translator, replacement translators, and Class A television facilities on Channel 51, and displacement applications on this channel; and (2)

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[42] A video of the workshop is available for streaming on the Internet at http://www.fcc.gov/events/700-mhz-interoperability-workshop.

[43] *See, e.g.*, Workshop comments of Edgar Fernandes, Motorola; Workshop comments of Eugene Fong, Qualcomm; Workshop comments of Paul Kolodzy, Consultant to Vulcan Wireless; Workshop comments of Eric B. Graham, Cellular South. A video of the workshop is available for streaming on the Internet at http://www.fcc.gov/events/700-mhz-interoperability-workshop.

[44] *See, e.g.*, Workshop comments of William Stone, Verizon Wireless; Workshop comments of Stacey Black, AT&T. A video of the workshop is available for streaming on the Internet at http://www.fcc.gov/events/700-mhz-interoperability-workshop.

[45] *See, e.g.*, Workshop comments of Michael Chard, Qualcomm. A video of the workshop is available for streaming on the Internet at http://www.fcc.gov/events/700-mhz-interoperability-workshop.

[46] *See* Petition for Rulemaking and Request for Licensing Freezes by CTIA - the Wireless Association and Rural Cellular Association, RM-11626, filed March 15, 2011 (Channel 51 Petition).

[47] *Id.* at 4-5 (referencing potential for interference from Channel 51 broadcast stations into A Block base station receivers); *id.* at 5 (referencing potential for interference from A Block licensees into Channel 51 TV receivers).

[48] Media Bureau Seeks Comment on a Petition for Rulemaking and Request for Licensing Freezes, *Public Notice*, RM 11626, 26 FCC Rcd 4916 (MB 2011).

[49] General Freeze on the Filing and Processing of Applications for Channel 51 Effective Immediately and Sixty (60) Day Amendment Window for Pending Channel 51 Low Power Television TV Translator and Class A Applications, *Public Notice*, 26 FCC Rcd 11409 (MB 2011) (Channel 51 PN). The Media Bureau also announced that it would lift the previous freeze on the filing of petitions for rulemaking by full power television stations seeking to relocate from Channel 51 pursuant to voluntary relocation agreements with Lower 700 MHz A Block licensees. *Id.* at 11411; *see also* Freeze on the Filing of Petitions for Digital Channel Substitutions, Effective Immediately, *Public Notice*, 26 FCC Rcd 7721 (MB 2011).

applications for minor change for low power and full power television stations on Channel 51.[50]

16. *AT&T/Qualcomm Transaction.* On January 13, 2011, AT&T and Qualcomm filed an application for Commission consent to the assignment or transfer of control of all eleven of Qualcomm's D and E Block licenses in the Lower 700 MHz band to AT&T.[51] The Commission sought comment on the proposed transaction.[52] Several parties asked the Commission to impose requirements relating to device interoperability as a condition of approving the transaction.[53] After examination of the record, the Commission approved the assignment on December 22, 2011, but declined to adopt an interoperability condition.[54] The Commission observed that even assuming that the lack of Lower 700 MHz interoperability causes significant competitive harm, such harm already existed independent of the license transfer applications.[55] The Commission concluded that the better course would be to consider the numerous technical issues raised by the lack of interoperability through a rulemaking proceeding, which we undertake in this NPRM.[56]

## III. DISCUSSION

### A. Challenges to Achieving Interoperability

17. The Commission historically has been interested in promoting interoperability. Beginning with the licensing of cellular spectrum, the Commission has opined that consumer equipment should be capable of operating over the entire range of cellular spectrum as a means to "insure full coverage in all markets and compatibility on a nationwide basis."[57] Although the Commission did not adopt a rule to require band-wide interoperability for PCS, it again stressed the importance of

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[50] Channel 51 PN, 26 FCC Rcd at 11409. The filing of petitions for rulemaking for new digital full power television stations, including those for channel 51, is frozen as well. *See* Freeze on the Filing of Certain TV and DTV Requests for Allotment or Service Area Changes, *Public Notice*, 19 FCC Rcd 14810 (MB 2004). Therefore, petitions for rulemaking for new channel 51 allotments cannot be filed. In addition, the Media Bureau is not currently accepting any applications for major changes to existing analog and digital LPTV and TV translator facilities. *See* Freeze on the Filing of Applications for New Digital Low Power Television and TV Translator Stations, *Public Notice*, 25 FCC Rcd 15120 (MB 2010).

[51] The applicants amended their application on February 9, 2011. *See* FCC File No. 0004566825.

[52] AT&T Mobility Spectrum LLC and Qualcomm Incorporated Seek FCC Consent to the Assignment of Lower 700 MHz Band Licenses, WT Docket No. 11-18, *Public Notice*, 26 FCC Rcd 1336 (2011).

[53] *See, e.g.*, Cellular South Petition to Deny, WT Docket No. 11-18, at 5-6, 19; RTG Petition to Deny, WT Docket No. 11-18, at 19; RTG Reply Comments, WT Docket No. 11-18, at 7; RCA Petition to Deny, WT Docket No. 11-18, at 12; King Street Petition to Deny, WT Docket No. 11-18, at 5; Free Press Petition to Condition Grant, WT Docket No. 11-18, at 5; Letter from Michele C. Farquhar, Counsel to Vulcan Wireless LLC., to Marlene H. Dortch, FCC, WT Docket No. 11-18, filed May 27, 2011 (Vulcan May 27, 2011 *Ex Parte* in WT Dkt. No. 11-18), Attachment at 6.

[54] *See AT&T/Qualcomm Order*, 26 FCC Rcd at 17591 ¶ 5.

[55] *AT&T/Qualcomm Order*, 26 FCC Rcd at 17620 ¶ 71.

[56] *AT&T/Qualcomm Order*, 26 FCC Rcd at 17620 ¶ 71 (noting that the Commission planned to begin such a rulemaking proceeding in the first quarter of 2012).

[57] Inquiry Into the Use of the Bands 825-845 MHz and 870-890 MHz for Cellular Communications Systems; and Amendment of Parts 2 and 22 of the Commission's Rules Relative to Cellular Communications Systems, CC Docket No. 79–318, *Report & Order*, 86 FCC 2d 469, 482 (1981) (*Cellular Report and Order*). The Commission adopted band-wide interoperability requirements for cellular service. *Id.*

interoperability by acknowledging industry efforts to establish voluntary interoperability standards and asserted that "[t]he availability of interoperability standards will deliver important benefits to consumers and help achieve our objectives of universality, competitive delivery of PCS, that includes the ability of consumers to switch between PCS systems at low cost, and competitive markets for PCS equipment."[58] The Commission also stated that if PCS technology did not develop in a manner to accommodate roaming and interoperability, it might consider "what actions the Commission may take to facilitate the more rapid development of appropriate standards."[59]

18. *Availability of End-User Equipment.* According to the Petitioners, a lack of interoperability in the Lower 700 MHz band has cut off meaningful access for many Lower A Block licensees to cutting-edge devices, and even those that do have access are able to acquire only a fraction of what other 700 MHz licensees are able to procure. Petitioners and proponents of a near-term interoperability requirement make essentially two arguments. Specifically, Vulcan argues that equipment vendors currently first serve the needs of "the unique band class that is dominated by AT&T" and that this slows the time to market for Lower A Block licensees because they experience a lack of access to new devices and face delays in the development of standards, chipsets, and equipment.[60] Similarly, RTG asserts that equipment manufacturers have little incentive to innovate and provide compatible devices for smaller markets, particularly when providing interoperable devices would run contrary to their largest customers' desires.[61]

19. Petitioners and other proponents also claim that an interoperability requirement should enable Lower A Block licensees and other Lower 700 MHz licensees to benefit from economies of scale with respect to mobile devices, which in turn would promote greater affordability that can be passed along to consumers. RCA argues that even where Band Class 12 equipment can be made available, the costs are unnecessarily inflated by the limited scale resulting from the lack of interoperability across the 700 MHz spectrum.[62] According to the record, Cellular South was able to find a manufacturer willing to supply it with devices that included, at a minimum, Band Class 12 frequencies, but "the cost of obtaining such devices without the economies of scale available based upon demand for similar devices by a nationwide carrier made pursuing the opportunity not economically feasible."[63] Cellular South asserts

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[58] Amendment of the Commission's Rules to Establish New Personal Communications Services, RM-7140, RM-7175, RM-7618, GEN Docket No. 90-314, *Memorandum Opinion and Order*, 9 FCC Rcd 4957, 5021-22 ¶¶ 163-64 (1994) (*Broadband PCS Memorandum Opinion and Order*).

[59] *Id.* at 5022 ¶ 164.

[60] Vulcan May 27, 2011 *Ex Parte,* Attachment at 11. Vulcan notes that AT&T developed a new band class and has completed product development in the time it has taken Lower A Block licensees to get their band class approved and that Verizon Wireless "had its LTE network deployed covering 100+ million US POPs before Band Class 12 was even fully ratified in the LTE standards body." *Id.*

[61] RTG Reply Comments in WT Docket No. 11-18 at 10.

[62] *See* Letter from Steven K. Berry, President and CEO, RCA, to Marlene H. Dortch, FCC, filed Mar. 29, 2011, at 1. RCA also states that equipment manufacture depends on scale economies and that AT&T and Verizon Wireless are sufficiently large to achieve these economies alone. In contrast, Lower A Block licensees have insufficient scale to develop affordable end user devices that would work on the A Block. Letter from Rebecca Murphy Thompson, General Counsel, RCA, to Marlene H. Dortch, FCC, filed Aug. 10, 2010 (RCA Aug. 10, 2010 *Ex Parte*) Attachment, "700 MHz Device Flexibility Promotes Competition" by Peter Cramton, Professor of Economics, University of Maryland (Cramton Report) at 7.

[63] Letter from David L. Nace, Lukas, Nace, Gutierrez, & Sachs, LLP, Counsel for 700 MHz Block A Good Faith Purchasers Alliance, to Marlene H. Dortch, FCC, filed June 8, 2010, at 2 (Information regarding Cellular South's

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that the necessary "scale" to obtain pricing that would allow it to bring devices to market would be expected to involve more than one million devices and in any case no less than a half million devices.[64]

20. Nationwide providers AT&T and Verizon Wireless respond that Lower 700 MHz A Block licensees are free to negotiate with device manufacturers.[65] Verizon Wireless claims that "those decisions have to be made by those carriers to meet their own individual business plans. Verizon Wireless has nothing to do with those decisions."[66] Verizon Wireless also asserts that there are at least 33 companies that manufacture devices for the U.S. market and that Petitioners "provide no evidence about their efforts (or the apparent lack thereof) to obtain the devices they want, either individually or through a consortium, from any of these potential suppliers."[67]

21. We seek comment on Petitioners' and other proponents' argument that an interoperability requirement in the 700 MHz band is necessary to obtain affordable, advanced mobile devices to deploy service to consumers in smaller, regional, and rural service areas. To what extent have any Lower A Block licensees successfully negotiated with equipment vendors to date? What efforts have other Lower A Block licensees undertaken to negotiate with equipment vendors? Would an interoperability requirement help enable Lower A Block licensees to benefit from economies of scale with respect to mobile devices, and what would be the benefits to consumers? Do manufacturers require a provider to purchase a minimum number of devices? If so, what is that number and is it prohibitive for a smaller provider to achieve such a scale? We seek data and evidence in support of all of these claims.

22. *Effect on the Deployment of Advanced Broadband Services.* The record to date suggests that, unless mobile user equipment is capable of operating on all paired commercial Lower 700 MHz spectrum, the deployment of facilities-based mobile broadband networks could be hampered, particularly in rural and unserved areas. We note that a significant number of Lower A Block licenses are held by smaller, rural, and regional licensees.[68] Petitioners and proponents argue that requiring all Lower 700

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experience was provided on behalf of Cellular South, a member of the 700 MHz Block A Good Faith Purchasers Alliance, during the course of the *ex parte* presentation.).

[64] *Id.*

[65] AT&T Comments at 13 (asserting that "A Block licensees are free to negotiate with handset manufacturers to design, manufacture, and deploy wireless handsets and other devices that operate within their spectrum holdings, including Band Class 12 or other commercial spectrum"); Verizon Wireless Comments at 9 (asserting that petitioners are free to work either collectively or individually with manufacturers to build devices that operate on the spectrum their members voluntarily acquired, and those devices could include other spectrum besides Band Class 12).

[66] Verizon Wireless Comments at 9 n.10. Verizon Wireless also asserts that the fact that 3GPP has established various band classes for the LTE standard does not compel any service provider or any device manufacturer to use any particular class, or to limit devices to operation in only one class, or to use LTE at all. *Id.* at 4. Further, other arrangements of bands could be proposed for the LTE standard as another band class, and each provider deploying LTE must determine which of the classes or combinations of classes is best suited to meet its authorized spectrum requirements and its business plans. *Id.*

[67] *See id.* at 9 n.10 (citing Letter from Christopher Guttman-McCabe, CTIA, to Marlene H. Dortch, FCC, RM 11361, filed May 12, 2009 at 2 and accompanying charts).

[68] According to the Commission's Universal Licensing Database (ULS), the 700 MHz A Block licensees include Vulcan, U.S. Cellular (King Street Wireless), Rural Cellular Corp., PVT, NTUA Wireless, MetroPCS, Cox Wireless, Continuum 700, CenturyTel, Cellular South, Cavalier Wireless, Alltel Communications Wireless, and

(continued....)

MHz licensees to use interoperable equipment would increase the likelihood that these Lower A Block licensees can obtain the necessary financing to deploy networks and devices.[69] They add that the inability of small and regional providers to obtain interoperable devices impedes their ability to compete in the provision of 4G services, makes it difficult to maintain current customers and acquire new ones, results in equipment costs that are higher than for other bands, and creates uncertainty for spectrum holders that could have adverse effects on investment in deployment of networks and devices.[70] RCA and Triad argue that Lower A Block licensees' inability to obtain affordable end user devices could cause the A Block spectrum to remain fallow for an extended period of time.[71]

23. AT&T responds that an interoperability requirement in the Lower 700 MHz spectrum would impose unreasonable burdens on AT&T's ability to build out its Lower 700 MHz spectrum. Specifically, AT&T claims that such a requirement would create "substantial disruption and delay to [its] current LTE deployment plans and significant additional costs."[72] AT&T claims that if it were required to abandon plans to use Band Class 17 and deploy a network around Band Class 12, it would need to upgrade its LTE base stations and develop and obtain "new chipsets, devices and radio equipment, a process that usually takes years to complete."[73] It also asserts that adding Band Class 12 capabilities into its mobile devices along with Band Class 17 capabilities would make the devices substantially larger, likely shorten battery life, and potentially require the tradeoff of other uses, such as bands used for international roaming.[74] In addition, as discussed below, AT&T's objections also stem from issues associated with potential interference concerns from Channel 51 operations and high power Lower E Block broadcasts.[75]

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Traid 700. We also note that Verizon Wireless holds many Lower A Block licenses. *See* Verizon Wireless Comments at 11 (stating that it holds 25 such licenses); Verizon Wireless Reply Comments at 5.

[69] Petition at 5; *see also* Triad Comments at 5. According to Blooston, separate band specifications for different Lower 700 MHz Bands "will shift equipment design and development costs onto rural and regional 700 MHz licensees and their customers" and "delay[ ] rural network buildout and availability of service . . . ." Blooston Reply Comments at 2.

[70] *See, e.g.*, RCA Comments at 11 ("If the *status quo* is not altered, small rural and regional wireless carriers will be less able to compete against the large wireless carriers, the Lower A Block spectrum will be devalued, consumers will have fewer roaming options, and small rural and regional Lower A Block licensees will face high hurdles in attempting to deploy broadband infrastructure utilizing 700 MHz spectrum in rural areas."); Letter from David Nace, Lukas, Nace, Gutierrez & Sachs, LLP, Counsel to Cellular South, to Marlene H. Dortch, FCC filed Mar. 9, 2010 at 2 (asserting an urgent need for Commission action on interoperability to realize potential for competition in the 700 MHz bands); U.S. Cellular Comments at 2-3 (stating the lack of interoperability impedes competitive roll out of 4G coverage by additional commercial providers, increases cost of Band Class 12 devices, and diminishes incentives for innovation); Blooston Reply Comments at 8 (lack of interoperability harms consumers). RCA also asserts that requiring interoperability in the 700 MHz Band will improve service, especially in rural areas, as a result of greater coverage and seamless roaming. *See* RCA Aug. 10, 2010 *Ex Parte*, Cramton Report at 1.

[71] *See* RCA Aug. 10, 2010 *Ex Parte*, Cramton Report at 7 (inability to obtain devices may cause Lower A Block licenses to be "orphaned for multiple years"); Triad 700 Comments at 3 (lack of devices may cause smaller Lower A Block licensees' spectrum to "lay fallow for a long period of time").

[72] AT&T Dec. 9, 2011 *Ex Parte* in WT Dkt. No. 11-18 at 3.

[73] *Id.*

[74] *Id.*

[75] *Id.*

24. We ask commenters to submit additional detailed metrics to evaluate the effects of an interoperability requirement on competition. Specifically, would the use of interoperable equipment promote consumer choice by facilitating the portability of mobile devices between service providers, thereby allowing consumers to switch more easily between providers?[76] At the same time, would deployment of Lower 700 MHz B and C Block service be delayed by a move towards interoperability, either by rule or industry agreement? What would be the relevant costs associated with possible Commission action? What costs would Lower 700 MHz B and C licensees who have already committed to Band Class 17, or who plan to do so, incur if we adopt an interoperability rule in the Lower 700 MHz spectrum?

25. Would a requirement that mobile user equipment be capable of operating on all paired commercial Lower 700 MHz spectrum facilitate deployment of facilities-based mobile broadband networks in rural and unserved areas? Are Lower A Block licensees just as likely to obtain funding and obtain affordable mobile equipment without Commission action? We also seek specific data and anecdotal evidence to support claims that an interoperability obligation would require complete redesign and upgrade of devices and base stations. We seek additional information on the necessary changes to chipsets and the timeframes these changes will impose.

26. U.S. Cellular recently announced the planned launch of a 4G LTE network that will cover 25 percent of U.S. Cellular's customers and will use the 700 MHz licenses of its partner, King Street Wireless.[77] C-Spire, in contrast, reportedly has delayed its previously announced launch of its 4G LTE network.[78] We ask Lower A Block licensees to provide detailed information on the effect that a lack of interoperability has had, if any, on their efforts to deploy service. Commenters should be as specific as possible and should, where possible, include data or affidavits.

27. *Roaming.* A number of commenters argue that an interoperability requirement would promote roaming among 700 MHz licensees.[79] These proponents argue that requiring the use of interoperable equipment in the Lower 700 MHz band would promote the commercial availability of mobile device equipment for all Lower 700 MHz licensees.[80] Without that equipment, Lower 700 MHz A Block licensees maintain they cannot build out their networks, which they claim is a prerequisite for the negotiation of roaming agreements.[81] Petitioners also claim that they have no reason to expect such

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[76] Consumers Union notes that lack of interoperability in the 700 MHz Band would prevent consumers from taking their phones with them if they choose to sign up with a new wireless provider. Letter from Parul P. Desai, Policy Counsel, Consumers Union, to Chairman Julius Genachowski, FCC, filed Feb. 10, 2011 (Consumers Union Feb. 11, 2011 *Ex Parte*) at 2.

[77] *See* Press Release, U.S. Cellular, U.S. Cellular Announces Launch of 4G LTE Network Next Month Along With Upcoming Devices (Feb. 1, 2012), *available at* http://www.uscellular.com/about/press-room/2012/USCELLULAR-ANNOUNCES-LAUNCH-OF-4G-LTE-NETWORK-NEXT-MONTH-ALONG-WITH-UPCOMING-DEVICES.html (last accessed Feb. 16, 2012) (U.S. Cellular Feb. 1, 2012 Press Release).

[78] *See* Alan F., *C-Spire misses target date for LTE service*, PHONEARENA.COM, http://www.phonearena.com/news/C-Spire-misses-target-date-for-LTE-service_id25551 (last accessed Feb. 16, 2012).

[79] *See, e.g.*, Letter from Benjamin M. Moncrief, Director, Government Relations, C Spire Wireless, to Marlene H. Dortch, FCC, filed Dec. 22, 2011 at 2; Letter from Grant B. Spellmeyer, Esq., Executive Director, Federal Affairs & Public Policy, U.S. Cellular, to Marlene H. Dortch, FCC, filed Dec. 21, 2011 at 1; Free Press Dec. 20, 2011 *Ex Parte* at 2; Letter from Rebecca M. Thompson, General Counsel, RCA, to Marlene H. Dortch, FCC, filed Oct. 28, 2011 at 1; Petition at 4; PVT Comments at 4; FOP Comments at 2-6.

[80] Petitioners Reply Comments at 21.

[81] Petitioners Reply Comments at 22.

mobile devices to be available on a widespread, affordable basis in the 700 MHz band and without such devices, there is nothing to negotiate.[82] Petitioners contend that small rural and regional carriers are in no position to place bulk orders for mobile devices that work in the Lower 700 MHz A Block and also work in other 700 MHz frequency blocks.[83] They claim that AT&T and Verizon Wireless are the only ones who hold the market power with the device manufacturers and the two carriers currently are developing mobile devices that work exclusively on their bands.[84] Without interoperable devices, Petitioners state that there will be no roaming in the 700 MHz band.[85]

28. NTCA states that mobile customers rely on and expect a "seamless experience" that is made possible by roaming arrangements.[86] Without roaming, NTCA explains that customers will experience "isolated islands of service."[87] Further, Petitioners and other supporters assert that even if Band Class 12 equipment were available, from a technical perspective, Band Class 17 device users would be unable to roam on Band Class 12 networks operating on Block A.[88] They argue that a lack of interoperability leaves customers of small carriers "without an option for a nationwide service, perpetually unable to roam on the networks of the large carriers."[89]

29. AT&T and Verizon Wireless respond that the Lower A Block licensees are not prevented from negotiating roaming arrangements with providers offering services on the other 700 MHz blocks.[90] AT&T also responds that A Block licensees are free to negotiate with handset manufacturers to design, manufacture and deploy wireless handsets and other devices that operate within the spectrum bands that are needed based upon their spectrum holdings and business plans, including Band Class 12 or other commercial spectrum."[91] AT&T argues that "[t]he Commission should not take action to force carriers to utilize a certain spectrum band for roaming," but that carriers should be able "to choose their roaming partners based on factors like network compatibility, price, coverage, and call quality."[92] We seek comment on whether interoperability would promote reasonable roaming arrangements among 700 MHz providers and would increase the number of providers that are technologically compatible for roaming partnership.

### B. Potential for Harmful Interference

30. Even if the record demonstrates that the existence of two distinct band classes in the Lower 700 MHz band is creating a device and network deployment problem, the Commission must

[82] Petitioners Reply Comments at 22. As discussed above, U.S. Cellular, however, recently announced the upcoming launch of two 4G LTE devices for the Lower 700 MHz Blocks. *See* U.S. Cellular Feb. 1, 2012 Press Release, *supra* note 77.

[83] Petitioners Reply Comments at 22.

[84] Petitioners Reply Comments at 22-23.

[85] Petitioners Reply Comments at 22.

[86] NTCA Comments at 3-4.

[87] NTCA Comments at 3.

[88] *See* Petitioners Reply Comments at 20; Triad 700 Comments at 6; NTCH Comments at 3.

[89] NTCA Comments at 4; *see also* Petitioners Reply Comments at 21.

[90] AT&T Comments at 13; Verizon Wireless Comments at 6.

[91] AT&T Comments at 13.

[92] AT&T Comments at 13, n.20.

ultimately resolve the central question as to whether a single band class would cause widespread harmful interference to Lower 700 MHz B and C Block licensees, who would otherwise use Band Class 17 devices rather than Band Class 12.

31. Interoperability issues are particularly relevant at this time, as licensees are in the process of deploying LTE in the Lower 700 MHz band. As of December 2011, AT&T has launched LTE service using its Lower 700 MHz B and C Block licenses in 15 markets.[93] In addition, as noted above, U.S. Cellular recently announced the planned launch of an LTE network that will cover 25 percent of its customers and will use the 700 MHz licenses of its partner, King Street Wireless.[94] As discussed earlier, there are two Lower 700 MHz band LTE standards for the Lower 700 MHz band, with 3GPP Band Class 17 spanning the B and C Blocks,[95] and Band Class 12 spanning the A, B, and C Blocks.[96] Some commenters have argued that this, in turn, fragments the device ecosystem for LTE devices that operate in the Lower 700 MHz band and prevents interoperability.[97]

32. Commenters argue that there would be two primary interference concerns for providers operating in the Lower 700 MHz B and C Blocks if these providers were to substitute Band Class 12 for Band Class 17 in newly-offered devices (as opposed to adding Band Class 12 capabilities into devices along with Band Class 17): (1) reverse intermodulation interference from adjacent DTV Channel 51 operations; and (2) blocking interference from neighboring high-powered operations in the Lower 700 MHz E Block.[98] We focus our technical analysis on these two primary issues. We note that some commenters also express concern regarding the need to deploy wider filters in order to migrate to Band Class 12.[99] We observe, however, that a transition from Band Class 17 to Band Class 12 does not necessitate a change to base station filtering. Operators deploying networks in the Lower 700 MHz B and C Blocks can continue to filter base station receivers as they would for Band Class 17, and thus interference from Channel 51 to B and C Block base stations is the same regardless of whether Band

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[93] *See* AT&T Dec. 9, 2011 *Ex Parte* in WT Dkt. No. 11-18 at 3.

[94] *See supra* note 77.

[95] 704 MHz-716 MHz and 734 MHz-746 MHz.

[96] 699 MHz-716 MHz and 729 MHz-746 MHz.

[97] *See, e.g.*, U.S. Cellular Comments at 6-7 (in the absence of vendor support by the two largest spectrum holders in the 700 MHz band, the vendor community has been reluctant to develop chipsets, filters, amplifiers and other device components to support Band Class 12 and 14 operations); Letter from Michele C. Farquhar, Hogan Lovells, Counsel to Vulcan, to Marlene H. Dortch, FCC, filed Dec. 12, 2011, Attachment at 3 (700 MHz band is characterized by "unprecedented band class fragmentation and delays, slower ecosystem development and less consumer choice").

[98] Letter from Trey Hanbury, Coalition for 4G in America, to Marlene H. Dortch, FCC, filed May 27, 2010 (Coalition for 4G in America May 27, 2010 *Ex Parte*) Attachment at 7-9 (now known as "Connect Public Safety Now"); Letter from Lawrence R. Krevor, *et al.*, Coalition for 4G in America, to Marlene H. Dortch, FCC, WT Docket No. 06-150, PS Docket No. 06-229, GN Docket No. 09-51, filed Sept. 20, 2010, at 2; 3GPP TSG RAN WG4 (Radio) Meeting #47, R4-081108, "TS36.101: Lower 700 MHz Band 15"; Petitioners Reply Comments at 40-44; Letter from Steve B. Sharkey, Senior Director, Reg. and Spectrum Policy, Motorola, *et al.*, to Marlene H. Dortch, FCC, filed Feb. 8, 2010 at 2; AT&T Comments at 2, 4-6. In light of the Commission's recent approval of AT&T's acquisition of Qualcomm's 700 MHz D Block licenses, however, high-powered D Block transmissions will no longer pose an interference issue. *See AT&T/Qualcomm Order*, 26 FCC Rcd at 17616 ¶¶ 61-63 (requiring AT&T to operate on D and E block spectrum under same power limits and antenna height restrictions applicable to Lower 700 MHz A and B Block licensees).

[99] Qualcomm Comments at 2; Motorola Comments at 4.

Class 12 devices or Band Class 17 devices are used. Commenters also raise other potential interference concerns, including interference from Band Class 12 devices into Channel 51 television receivers,[100] and other interference issues that are specific to operations in the A Block. We do not address those issues herein. We focus the scope of this proceeding to interference to Lower 700 MHz B and C Block operations that may result from the adoption of Band Class 12 devices by Lower 700 MHz B and C licensees, whether voluntarily or by regulatory mandate.

33. AT&T asserts that both reverse intermodulation and blocking interference are significant issues. It expects that managing and mitigating the interference from Channel 51 and any high power Lower E Block broadcasts to its network would account for the greatest expenses, and that its customers would not, on balance, benefit from AT&T migrating to Band Class 12.[101] AT&T argues that if it were required to use Band Class 12 devices as opposed to Band Class 17 devices, its customers would be forced to use devices that would expose them to interference risks (from Channel 51 and the E Block) they otherwise would not face.[102] Notwithstanding the foregoing, AT&T affirms that it does not object to supporting interoperability in the Lower 700 MHz band, assuming supply chain availability, if interference challenges from Channel 51 and the Lower 700 MHz E Block licensees are addressed to its satisfaction.[103]

34. With regard to the Channel 51 interference concerns, Motorola's view in its original 3GPP proposal to create Band Class 17 was that reverse intermodulation interference could happen when Band Class 12 devices are close to high-powered Channel 51 transmission towers, which it believes could result in in-band interference because of the limited radio frequency (RF) filtering capability of Band Class 12 filters.[104] According to Motorola's paper, "the key issue" in determining the possibility of such interference is "the level of the DTV Channel 51 wideband signal that would be present at the UE antenna port based on a reasonable deployment scenario," but Motorola does not provide evidence showing the circumstances that could produce conditions suitable to create reverse intermodulation interference from Channel 51.[105]

35. Proponents of an interoperability requirement argue that no reverse intermodulation interference would occur, and that if an operator does experience any such interference, solutions exist to

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[100] *See, e.g.*, Letter from Joseph P. Marx, Assistant Vice President, AT&T Services, Inc., to Marlene H. Dortch, FCC, filed May 28, 2010, Attachment at 5; Letter from Steve Sharkey *et al.*, Motorola, Inc., to Marlene H. Dortch, FCC, filed Feb. 12, 2010 at 2.

[101] AT&T Dec. 9, 2011 *Ex Parte* in WT Dkt. No. 11-18 at 3. AT&T does not attempt to quantify the cost of mitigating potential harmful interference to its network in the event of an interoperability requirement except to state that the cost "could easily total billions of dollars." *Id.* at 4.

[102] AT&T Reply Comments at 10; AT&T July 29, 2011 *Ex Parte* at 6 (stating that an interoperability requirement "would require consumers with Band 17 devices (that are free of interference risk from Channel 51and the E Block) to obtain new devices with Band 12 radios that expose them to such interference").

[103] Letter from Joan Marsh, Vice President – Federal Regulatory, AT&T, to Marlene H. Dortch, FCC, WT Docket No. 11-18, filed Dec. 22, 2011 at 1.

[104] *See* Motorola, "TS36.101: Lower 700 MHz Band 15," 3GPP TSG-RAN WG4 meeting #47, Kansas City, MO, USA (April 2008) at 1-2, available at http://www.3gpp.org/ftp/tsg_ran/wg4_radio/TSGR4_47/Docs/R4-081108.zip. (Motorola presented its paper at Meeting #47 of the WG4 in May 2008.) The large in-band interfering signals would then combine with Band Class 12 device transmissions to generate intermodulation products in other parts of the 700MHz Band. *Id.*

[105] *Id.*

mitigate Channel 51 interference concerns to Band Class 12 devices operating in the B and/or C Blocks. According to Cellular South and King Street Wireless, "With [less than five megahertz] Tx bandwidth, any Channel 51-700 intermodulation products would not fall within the device receive blocks (no self-interference issue)."[106] They represent that this is because a strong signal from Channel 51 must mix with a full-power Lower 700 MHz B and C Block device transmission, but "LTE base stations do not allow devices to transmit at full power with [greater than five megahertz] bandwidth due to a self-desense issue."[107] Essentially, Cellular South and King Street Wireless argue that power amplifier linearity in a mobile device improves considerably when it is not transmitting at full power and that if the device transmitted bandwidth is less than five megahertz, then intermodulation products resulting from the combination of Channel 51 and Lower 700 MHz band C Block transmit frequencies would not cause intermodulation interference. Finally, they point out that if intermodulation interference is experienced, the wireless operator "may deploy an LTE base station several hundred meters away from the Channel 51 station to control device transmit power and provide a stronger downlink desired signal."[108]

36. Vulcan performed lab and field tests to test the assertion that "reverse intermodulation distortion caused by Channel 51 using a Band Class 12 device would create an interfering signal in the B Block receiver."[109] Based on the results of lab tests, Vulcan concludes that a minimum signal level of 0 dBm from Channel 51 would be necessary to create an interference signal at the noise floor of the B Block receiver, and field measurements showed that Channel 51 transmissions were no stronger than -21 dBm. The report indicates that the strongest signal strength in the field measurements of DTV Channel 51 is typically much lower than necessary to generate noticeable reverse intermodulation interference.[110] AT&T responds that the tests referenced by Vulcan do not represent real-world situations, because the tests occurred only within a two kilometer radius of the Channel 51 tower, whereas stronger signals from Channel 51 can occur at closer distances.[111]

37. With regard to interference from Lower E Block operations, Motorola asserts that receiver blocking performance may be degraded when Band Class 12 devices are close to high-powered Lower E Block transmission towers, due to limited Band Class 12 device out-of-band blocking rejection.[112] According to AT&T, Band Class 17, with an extra six megahertz of separation from the Lower E Block, was created to alleviate this concern, so that the device filter can provide sufficient attenuation of the E Block transmissions.[113] It further asserts that Band Class 12 has sub-optimal filtering because of the lack of sufficient frequency separation between the Lower E Block and the starting frequencies of Band Class 12.[114]

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[106] Cellular South/King Street May 27, 2011 *Ex Parte*, Attachment at 4.

[107] *Id.*, Attachment at 4.

[108] *Id.*, Attachment at 4.

[109] Letter from Michele C. Farquhar, Hogan Lovells, Counsel to Vulcan, to Marlene H. Dortch, FCC, filed Nov. 30, 2011 (Vulcan Nov. 30, 2011 *Ex Parte*), Attachment, "Study to Review Interference Claims that have Thwarted Interoperability in the Lower 700 MHz Band" at 12.

[110] *Id.*, Attachment at 12.

[111] Letter from Jim Bugel, Asst. Vice President, Public Safety and Homeland Security, AT&T, to Marlene H. Dortch, FCC, filed Dec. 7, 2011 (AT&T Dec. 7, 2011 *Ex Parte*) at 1.

[112] *Id.* at 2.

[113] AT&T July 29, 2011 *Ex Parte* at 2-4; AT&T Reply Comments at 10.

[114] AT&T July 29, 2011 *Ex Parte* at 3-4.

38. The Coalition for 4G asserts that network operators can eliminate potential interference from Lower E Block operations by deploying the A, B, or C Block base stations near the E Block transmitters.[115] In support of its position that interference from Lower 700 MHz E Block transmitters is manageable for Band Class 12 devices operating in Lower 700 MHz B and C blocks, Vulcan's lab and field tests assess the severity of interference issues to Band Class 12 devices from high power 50 kW transmissions in the Lower 700 MHz E Block.[116] The tests indicate that the Atlanta field measurements of the highest signal power ratios between the 50 kW Lower E Block and B Block are typically 15 to 30 dB lower than necessary to produce Lower B Block receiver blocking. The tests conclude that real-world tests found the anticipated interference circumstances are manageable and Band Class 17 is redundant.[117] Vulcan also asserts that the test results confirm Band Class 12 devices performance would not be worse than Band Class 17 devices, and that Band Class 17 already has greater levels of internal interference from within the Lower B and C Blocks.

39. In response, AT&T disagrees generally with the effectiveness of these potential mitigation techniques, stating that (1) increasing the number of cell sites near E Block transmitters or Channel 51 towers would increase the cost of providing 4G service, which would eventually be passed on to consumers, and (2) given the limited number of available site locations, coordination alone is insufficient to solve Band Class 12 interference issues.[118] AT&T also asserts that adequate coverage of a 50 kW mobile broadcast service in the market in which Vulcan conducted its testing would require at least thirteen Lower 700 MHz E Block transmitters, which would lead to higher signal levels compared to the four transmitters that were active when testing was conducted by Vulcan.[119] It is unclear, however, how much higher the signal levels may be close to a Lower E Block transmitter that is surrounded by twelve additional E Block transmitters versus one that is surrounded by only three. Whereas more base stations will improve overall signal levels and coverage, basic engineering calculations would suggest that any increase to the signal levels close to each base station, where signals may be strong enough to cause in-band receiver blocking interference to neighboring bands, would be negligible.

40. We seek comment on these and any additional technical and operational factors that should be taken into consideration in any transition to an interoperable Lower 700 MHz band. We ask interested parties to submit measurements and quantitative analyses regarding the magnitude and extent of the interference risk from adjacent Channel 51 and Lower Block E transmissions for Band Class 12 devices operating in the Lower B and C Blocks. How effective are existing mitigation measures, such as coordination between Lower 700 MHz and DTV Channel 51 licensees? Further, what innovative technical measures might be introduced in the near future, such as better performing RF duplexers and filters? What additional interoperability solutions exist or are being developed to address these interference concerns? We also seek comment on the performance of Band Class 12 devices compared to Band Class 17 devices, as well as on other factors relating to the operations in the Lower B and C Blocks. Furthermore, in the event unwanted harmful interference cannot be mitigated in some areas, we seek comment on whether the potential harm resulting from interference in those areas is outweighed by the

[115] Coalition for 4G May 27, 2010 *Ex Parte*, Attachment at 9 (now known as "Connect Public Safety Now").

[116] Vulcan Nov. 30, 2011 *Ex Parte*, Attachment at 1-2.

[117] Vulcan Nov. 30, 2011 *Ex Parte*, Attachment at 15-16 (field measurements were conducted with a 3dBi gain antenna; typical 700 MHz device antenna gain is -5dBi).

[118] Letter from Joseph P. Marx, Assistant Vice President, Federal Regulatory, AT&T, to Marlene H. Dortch, FCC, filed Nov. 2, 2010 at 4-5, 6-7.

[119] AT&T Dec. 7, 2011 *Ex Parte* at 2.

public interest benefits that would result from interoperability in the Lower 700 MHz band, and what factors should be considered in balancing these concerns.

41. As noted above, should Band Class 12 be substituted in devices for Band Class 17, operational issues may arise to the extent that a single network must be capable of supporting more than one device band class. That is, if a licensee chooses to continue supporting its existing grandfathered Band Class 17 devices, the wireless network will need to support both Band Class 17 devices and Band Class 12 devices. We seek comment on possible ways to address this issue. Since the two Band Classes overlap in frequencies, we think it is likely that there are relatively simple, cost effective solutions that will allow a single network to accommodate devices from both band classes. For example, would the Equivalent Home Public Land Mobile Network file (EHPLMN) update in devices allow the LTE network to support both Band Class 12 and Band Class 17 devices?[120]

42. We seek comment on whether there are measures the Commission should take to address Lower 700 MHz interference concerns that may be preventing the voluntary adoption of Band Class 12 by Lower B and C Block licensees. We note that AT&T asks the Commission to "modify the rules governing service in Channel 51 and in the 700 MHz Lower E Block to permit power levels, out of band emissions and antenna heights that are no greater than those currently permitted in the 700 MHz Lower A and B blocks, to allow downlink only in the Lower E Block and uplink only in Channel 51, and to relocate any incumbent high power broadcast operations out of Channel 51 and the Lower E Block."[121] In approving AT&T's acquisition of Qualcomm's Lower 700 MHz licenses (comprising all of the Lower 700 MHz D Block licenses and five of the Lower E Block licenses), the Commission included a condition that AT&T operate under the same power limits and height restrictions applicable to Lower 700 MHz A and B Block licensees, which will reduce the instances of high-powered operations in the Lower D and E Blocks.[122] Specifically, the Commission stated that "AT&T must operate on the Lower D and E Block licenses consistent with the limits set forth in Section 27.50(c), excluding Subsection 27.50(c)(7)."[123] The Commission also conditioned the transaction on AT&T's use of this spectrum only for downlink transmissions.[124] In addition, it conditioned the transaction on AT&T taking certain steps to mitigate possible interference caused by AT&T's use of the Lower D and E Blocks to the uplink operations of licensees operating in the Lower 700 MHz A, B, and C Blocks, including mitigating interference within 30 days after receiving written notice from the A, B, or C Block licensee.[125]

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[120] Qualcomm, Inc., "Multimode System Selection (MMSS) Basic Provisioning," 80-W3637-1 Rev B at 6-7 (Jan. 5, 2012), *available at* http://www.qualcomm.com/search/?query=%2280-W3637-1+Rev+B%22.

[121] AT&T Dec. 22, 2011 *Ex Parte* in WT Dkt. No. 11-18 at 1-2.

[122] *AT&T/Qualcomm Order*, 26 FCC Rcd at 17616 ¶¶ 62-63.

[123] *AT&T/Qualcomm Order*, 26 FCC Rcd at 17616 ¶ 62.

[124] *AT&T/Qualcomm Order*, 26 FCC Rcd at 17616 ¶ 65.

[125] *AT&T/Qualcomm Order*, 26 FCC Rcd at 17617 ¶ 67. Specifically, the condition requires AT&T to "(1) coordinate with the A, B, or C Block licensee to mitigate potential interference; (2) mitigate interference to A, B, or C Block operations within 30 days after receiving written notice from the A, B, or C Block licensee; and (3) ensure that D/E Block transmissions in areas where another licensee holds the A, B, or C Block license are filtered at least to the extent that D/E Block transmissions are filtered in markets where AT&T holds the A, B, or C Block license, as applicable." *Id.* U.S. Cellular urges the Commission to seek comment on and adopt a rule that imposes conditions on Lower E Block licensees consistent with the power limit restrictions, requirement for downlink-only transmissions, and interference mitigation requirements in the conditions adopted in the *AT&T/Qualcomm Order*. U.S. Cellular asserts that "[i]mposition of such conditions will serve the public interest by helping to accelerate the

(continued....)

43. We seek comment on whether we should modify our rules for Lower 700 MHz D and E Block operations, using the technical conditions set forth in the AT&T/Qualcomm decision as a template. Modifying our rules in this manner would lead to consistency in the technical requirements for the Lower D and E Blocks and would help to address potential harmful interference from operations on the Lower E Block licenses that are not held by AT&T. Would these modifications adequately address concerns that Lower B and C Block licensees may experience harmful interference from Lower D and E Block operations if they transition to Band Class 12? As a practical matter, would modifying our rules in this manner encourage Lower B and C Block licensees to voluntarily adopt interoperable devices? We also seek comment on how such modifications would affect the operations and plans of Lower E Block licensees, other than AT&T. What other modifications to the Lower 700 MHz D and E Block technical operational rules should we consider and what are the costs and public interest benefits of these alternative rules?

44. With respect to potential interference as a result of Channel 51 operations, are there steps the Commission could take to reduce the threat of such potential interference that would balance the needs and rights of Channel 51 incumbents with Lower 700 MHz licensees? What role, if any, should the passage of the Spectrum Act, which gives the Commission authority to conduct incentive auctions, including in the television broadcast bands,[126] have in our approach to potential interference from Channel 51 to the Lower 700 MHz band licensees? Could any measures be implemented without causing an undue burden on existing licensees? What is the likelihood that Channel 51 licensees will experience interference from operations in the Lower 700 MHz band?[127] Vulcan asserts that "Band Class 12 device interference into TV receivers is a claim that has never been substantiated," and that the potential for Channel 51 licensees to cause interference to A Block base stations "is a deployment issue to be managed by the Lower A Block licensees."[128] Aside from regulatory measures, what steps should the Commission take to encourage voluntary industry efforts to find solutions to interference concerns?

45. *Other Issues*. Commenters are concerned that if a provider adds Band Class 12 capabilities into mobile devices along with Band Class 17 (as opposed to substituting Band Class 12 for Band Class 17 in newly offered devices), the devices will be adversely affected with respect to form factor, cost, and battery life.[129] We seek comment on these assertions. What network-specific issues would arise, and how could licensees address those issues? How difficult or costly would it be for licensees to address any network-specific issues? Are there interim as well as long-term solutions that might be employed, and what is their timing? Are there any roaming or legacy device support issues that one solution may address that another may not? Given the highly technical and complex nature of this proceeding, we seek qualitative and quantitative data and engineering analyses to support commenters' claims.

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further development of the Lower 700 MHz ecosystem." Letter from Grant B. Spellmeyer, Executive Director, Federal Affairs and Public Policy, U.S. Cellular, to Marlene H. Dortch, FCC, filed March 15, 2012, at 1.

[126] *See* Spectrum Act, Pub. L. No. 112-96, 126 Stat. 158, 222-25 (2012).

[127] We note that we intend to open a separate proceeding to address potential interference issues between Channel 51 television operations and Lower 700 MHz A Block operations.

[128] Letter from Michele C. Farquhar, Hogan Lovells, Counsel to Vulcan, to Marlene H. Dortch, FCC, filed Dec. 15, 2011, Attachment at 4.

[129] AT&T Dec. 9, 2011 *Ex Parte* in WT Docket No. 11-18 at 3; Letter from Praveen Goyal, Senior Director, Corporate and Government Relations, Research In Motion Corp., to Marlene H. Dortch, FCC, filed July 27, 2011, Attachment at 10-13.

46. Finally, we seek comment on whether our efforts should be focused exclusively – as they are now – on interoperability in the Lower 700 MHz band, as opposed to the entire band. As we noted above, although the Petition initially requests an interoperability requirement that requires mobile equipment to be capable of operating on all paired commercial frequency blocks in both the Upper and Lower 700 MHz bands, subsequent filings from some of the proponents of an interoperability requirement focus on requiring the use of Band Class 12 devices in the Lower 700 MHz band.[130] We note that there are unique interference environments and different technology-related issues, including the ability of equipment to accommodate multi-band interoperability, that are specific to the Lower versus Upper 700 MHz bands, as well as additional issues pertaining to consideration of requiring equipment to accommodate multi-band interoperability.[131]

### C. Promoting Interoperability

47. Assuming we conclude that concerns regarding harmful interference to Lower 700 MHz B and C Block licensees are not a reasonable obstacle to interoperability or can be mitigated through industry efforts and/or Commission action, we seek comment on whether there is likely to be a timely industry solution to interoperability in the Lower 700 MHz band, or whether additional regulatory measures will be necessary to promote interoperability across the Lower 700 MHz band. Commenters currently supporting Band Class 17 suggest that resolving interference concerns would encourage the use of Band Class 12. For example, Verizon asserts that it "fully supports commercial development of Band Class 12 devices," and that "actions addressing interference issues would spur evolution of the device market toward full Lower 700 MHz interoperability."[132] AT&T asserts that, if interference challenges from high power broadcasts in Channel 51 and in the Lower 700 MHz E Block are addressed satisfactorily, it will not object to supporting interoperability in the Lower 700 MHz band.[133] Further, AT&T contends that "these challenges can and should be addressed."[134] Absent a regulatory mandate to implement interoperability, will Lower 700 MHz licensees voluntarily ensure that all of the Lower 700 MHz spectrum used for mobile transmit is included in their mobile equipment?

48. In what timeframe would a voluntary migration to interoperable devices reasonably take

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[130] *See supra* n.35. We note that certain recent ex parte filings urge the Commission to consider interoperability across the entire 700 MHz band in light of the recent passage of the Spectrum Act, either now or in a future proceeding. *See, e.g.*, Letter from Harold Feld, Legal Director, Public Knowledge, to Marlene H. Dortch, FCC, filed March 13, 2012 at 2; Letter from Kathleen O'Brien Ham, Vice President, Federal Regulatory Affairs, T-Mobile USA, Inc., to Marlene H. Dortch, FCC, filed March 13, 2012 at 1, 4. Our focus on the Lower 700 MHz band in this NPRM does not preclude our consideration of broader interoperability issues, including interoperability across the entire 700 MHz band, in the future.

[131] The recent technical study submitted by a consortium of several Lower 700 MHz A Block licensees focuses on interference issues associated with the use of Band Class 17 versus Band Class 12 in the Lower 700 MHz Band. *See* Letter from Mark W. Brennan, Hogan Lovells, Counsel to Vulcan, to Marlene H. Dortch, FCC, filed Nov. 25, 2011, Attachment, "Study to Review Interference Claims that have Thwarted Interoperability in the Lower 700 MHz Band." We note that requiring interoperability in the Upper 700 MHz Band would introduce additional and unique interference scenarios, particularly technical issues related to implementing both Band Class 13 and Band Class 14 in a single device, as well as the use of such a device while also protecting GPS receivers and Public Safety Narrowband operations.

[132] Letter from Tamara Preiss, Vice President, Regulatory Affairs, Verizon Wireless, to Marlene H. Dortch, FCC, filed Feb. 13, 2012 at 1.

[133] AT&T Dec. 22, 2011 *Ex Parte* in WT Dkt. No. 11-18 at 1.

[134] AT&T Dec. 22, 2011 *Ex Parte* in WT Dkt. No. 11-18 at 1.

place? We note that while U.S. Cellular recently announced that it has impending plans to launch 4G LTE service, together with its partner King Street Wireless L.P., it nevertheless asserts that "the Commission must still act quickly to address issues related to interoperability within the lower 700 MHz bands."[135] Similarly, proponents of an interoperability requirement argue that action must be taken by the end of 2012.[136] Aside from the widespread and exclusive adoption of Band Class 12 in devices, which would necessitate only a single duplexer solution, what other solutions exist that might address interoperability concerns without regulatory intervention and within a reasonable timeframe? What would be a reasonable timeframe for a path to interoperability, and how will this timing affect consumers and competition?

49. We think that an industry solution to the question of interoperability in the Lower 700 MHz band would be preferable because such a solution allows the market greater flexibility in responding to evolving consumer needs and dynamic and fast-paced technological developments.[137] At the same time, we recognize that if the industry fails to move timely toward interoperability once interference concerns are adequately addressed (by regulatory action or otherwise), additional regulatory steps might be appropriate to further the public interest. The Commission staff will remain vigilant in monitoring the state of interoperability in the Lower 700 MHz band to ensure that the industry is making sufficient progress. What metrics and quantifiable data can the Commission use to measure whether the industry is making adequate progress towards achieving interoperability in the Lower 700 MHz band? In the event that such steps are warranted, we seek comment on whether it would be necessary to mandate interoperability in the Lower 700 MHz band or whether there are other, flexible regulatory measures that we should consider.

50. In the event that interference concerns are reasonably addressed and the Commission is left with no other option to maximize innovation and investment in the Lower 700 MHz band besides mandating mobile device interoperability, one approach would be to require Lower 700 MHz A, B, or C Block licensees, with respect to their networks operating in this spectrum, to use only mobile user equipment that has the capability to operate across all of these blocks. For example, those licensees deploying LTE in the Lower 700 MHz band would no longer be allowed to offer mobile units operating on Band Class 17, which provides for operation on only the Lower 700 MHz B and C Blocks. Those licensees deploying LTE in the Lower 700 MHz band would substitute Band Class 17 with Band Class 12.[138] We note that this approach focuses on mobile user device interoperability and would not require modifications to Lower 700 MHz B and C Block licensees' base stations beyond those necessary to support Band Class 12 devices operating on these licensees' authorized Lower 700 MHz frequencies only. In other words, we are not contemplating requiring licensees to implement base station operations on frequencies they do not have the potential to use, in order to spur production of base station elements that can be used only by licensees operating on other frequencies. We seek comment on this approach and how, if adopted, it would promote key public interest objectives, including competition and consumer

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[135] Letter from Grant B. Spellmeyer, Executive Director, Federal Affairs and Public Policy, U.S. Cellular, to Marlene H. Dortch, FCC, filed Feb. 8, 2012, at 1.

[136] *See, e.g.,* Letter from Rebecca Murphy Thompson, General Counsel, RCA, to Marlene H. Dortch, FCC, filed Jan. 19, 2012, at 2 (interoperability "must be implemented before the end of 2012 if competitive carriers are to remain viable"); Letter from Michele C. Farquhar, Counsel to Vulcan Wireless LLC, to Marlene H. Dortch, FCC, filed March 14, 2012, at 1 (requesting that the Commission adopt "an order in this proceeding before the end of 2012 that mandates interoperability across the Lower 700 MHz paired spectrum band as well as an implementation timeline").

[137] *See Broadband PCS Memorandum Opinion and Order*, 9 FCC Rcd at 5021-22 ¶¶ 163-64.

[138] *See supra* III. B (Potential for Harmful Interference).

choice among mobile broadband service providers, the widespread deployment of 4G networks, particularly in rural and unserved areas, the availability of additional innovative 4G devices, and increased roaming opportunities. In order to facilitate a smooth transition to interoperable mobile equipment use in the Lower 700 MHz band, we would propose a reasonable transition period of no longer than two years after the effective date of an interoperability requirement, thereby minimizing the possibility of stranded investments in existing equipment. Furthermore, we would propose to grandfather the use of devices already in use by consumers as of the transition deadline, so that consumers using existing Band Class 17 equipment would not be adversely affected. We seek comment on this approach – as well as on any alternative approaches, including associated costs and benefits – that might equally satisfy our public interest objectives in promoting the widespread deployment of broadband service and increased competition and consumer choice in the mobile broadband marketplace.

51. We note that, in considering whether to adopt rules to promote the development of interoperable equipment in the Lower 700 MHz band, we will consider a number of factors, including the costs or burdens that any such new obligation would impose on licensees or others, and whether the costs would be offset by benefits to consumers, including those that would result from innovation in the marketplace, increased investments in networks, or additional competition. We therefore request comment on the costs and the benefits of adopting rules that would promote interoperability. We also seek comment on the costs and benefits of an industry-based solution to interoperability in the Lower 700 MHz band. Are there cost savings to consider, or conversely, are there costs that Lower 700 MHz licensees would incur if the industry resolved the interoperability issue without a regulatory mandate?

52. Commenters should quantify the costs of implementing any proposed solutions to the interference issues discussed above. We seek comment on costs that Lower 700 MHz B and C licensees are likely to incur in order to comply with a device interoperability requirement, including quantification of the costs to develop and obtain new compatible chipsets or front ends; design and manufacture new mobile devices; and develop any hardware or software changes necessary to implement an interoperability requirement. How much will the costs and prices of devices change as a result of an interoperability requirement? We seek comment on the revenue implications an interoperability requirement would have for providers and device manufacturers. We also seek comment on quantifiable ways in which licensees may benefit from a sunset of devices capable of operating only on a subset of paired Lower 700 MHz frequencies. For example, will Lower 700 MHz licensees achieve economies of scale in devices? We seek quantification of these economies of scale. What cost savings might result from an interoperability rule? We also seek comment on the potential costs associated with interoperability if interference cannot be mitigated in some areas. In these areas, will the public interest benefits from interoperability outweigh the costs?

53. We seek data on consumer benefits that may result from interoperability, including greater affordability and availability of 4G equipment, increasing consumer choice in equipment, promoting the widespread deployment of broadband services, providing greater options in selecting a service provider, and facilitating greater roaming opportunities. How would a rule requiring interoperability affect innovation and investment, both in the near term and in the longer term? Would such a requirement foster additional competition, and how would any increase in competition be measured?

54. What are the particular benefits to consumers or others that would result from a device interoperability requirement that includes a reasonable transition period (*e.g.*, two years) and grandfathers the use of existing, non-interoperable devices after the transition deadline? We seek comment on the costs that licensees may incur in continuing to offer service for non-interoperable devices. How long will such devices need to be supported? Are there any classes of customers that will require longer-term support than others? Further, we seek comment on the extent to which the proposed transition period minimizes or alleviates any adverse economic impact to licensees and device manufacturers. Is there an